

FACES OF MASS SPECTROMETRY

Jean Futrell



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Instrumental Achievements

Dr. Jean Futrell is considered a founder of modern mass spectrometry and is among the most accomplished scientists in the field. He was named Battelle Fellow Emeritus at the Pacific Northwest National Laboratory in 2013, where he began working in 1998 as a director and was later named Battelle Fellow. Jean previously served as Chair of the Chemistry and Biochemistry Department at the University of Delaware. Earlier in his career, Jean held positions at the University of Utah, Wright-Patterson Air Force Base, and the Exxon Mobil Research Center. Jean is also a past president of the American Society for Mass Spectrometry. Over the course of his successful career, which spans over 50 years, Jean has accrued a long list of awards, achievements, and contributions—one of the most notable being the invention of the tandem mass spectrometer.

Jean grew up in Grant Parrish, Louisiana. He graduated from Louisiana Tech University with a bachelor's degree in chemical engineering and an eye toward a future working in the petroleum industry. However, things changed when Jean decided to attend the University of California, Berkeley to pursue a Ph.D. in physical chemistry. It was during this time that he was introduced to mass spec analysis. Furthermore, his Ph.D.

thesis was the first ever to determine the chemical products formed by ionizing radiation. This major achievement would be followed by many more as Jean established a prolific career specializing in instrumentation development and gas phase ion chemistry.

To scientists who are embarking on their own careers, Jean emphasizes the value of attending national and regional meetings to initiate conversations with other experts. Moreover, he highlights the importance of learning from both successes and failures, as well as recognizing everyone's talents and abilities regardless of their background

How did your undergraduate studies at Louisiana Tech University lead you to get your start in the mass spec field?

It was really a combination of the engineering degree that I initially pursued, when I assumed I would work for an oil company, and also my high school education. In high school, my teachers noticed that I had more interest in engineering than the average student, so they gave me their college textbooks to read. Then, when I got to Louisiana Tech for my undergraduate studies, I intended to get a degree in chemical engineering and thought I'd probably end up in a career in petroleum companies. From there, my horizons broadened, in part because my father was a section hand on the railroad, which enabled me to travel to California. From there, I learned that the University of California, Berkeley was a top-ranked school in the United States for their research and faculty.

When I got there, I knocked on the door at the Dean's Office of the College of Engineering to introduce myself and let them know I was exploring a graduate degree there. The Dean spent more than an hour showing me the various research groups and instruments they were using. Years later, I called the Dean to express my amazement and surprise that they showed interest in someone with absolutely no credentials—I asked, "Why would you take your valuable time to show a nobody around?" He explained that although they had contacts with the top-ranking schools throughout the nation, some of their very best graduates came from a random source by good fortune, and I was proof of that. I really was flattered and thought that was brilliant! Then, as my graduate studies progressed, I became interested in mass spec, because I had access to it as a way of identifying materials.

When did you decide to focus on instrumentation development and gas phase ion chemistry?

It was during my graduate studies that I became interested in such things. I was the first person to determine the chemical products that were formed by ionizing radiation with some of the major accelerators at UC Berkeley. I was one of the first students who



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Jean between ASMS President and former mentee Julia Laskin (right) and ASMS Historian P. Jane Gale (left), following the ASMS session in his honor at the 2023 Annual Meeting. (Photo courtesy of Jean Futrell.)

was interested in what happened to the chemical environment, and I got acquainted with mass spectrometry as a technique for identifying those products. My thesis was the first one in the world to deal with the products of ionizing radiation which attracted quite a bit of attention.

I should also note that I was a major researcher in the United States Air Force because I had an ROTC Commission at the station at Wright-Patterson. It was with Wright-Patterson that I got my first chance to deal with advanced instruments, modify them, and begin to investigate the details of ion molecule chemistry.

My international exposure occurred when Glenn Seaborg asked me to substitute for him as a speaker at the first meeting of the International Congress on Radiation Research. That was the year I graduated, and my thesis was the subject of my lecture. I was a little disappointed when my talk was scheduled for a Friday afternoon, because I thought it might limit my exposure. But many of the visitors from Europe stayed for that Friday afternoon lecture and were impressed—so, as I said before, it’s all about good fortune! Three years later, I was invited to be the keynote speaker at the Congress, which was held that year in Geneva, Switzerland. It was an amazing elevation going from my small high school to UC Berkeley then eventually establishing an international presence.

We understand that you are a past President of the American Society for Mass Spectrometry. What did you learn from that role?

ASMS gathers the very best leading minds in the United States and around the world in the field of mass spec, and it was because of my involvement that I got to know them. It gave me a place to go to call on people for advice in seeking my

greatest achievements. One of the instruments that I developed that caught international attention was the tandem mass spectrometer—that was one such achievement. My involvement in the American Society for Mass Spectrometry has tremendously helped my career.

We understand that you have been a strong advocate for diversity and inclusion within the science realm. How have you made efforts to promote these values?

The key to that story starts with my first name, Jean, which is actually the French equivalent of “John.” But here in the United States, that spelling typically gets interpreted to be a woman’s name. For that reason, I had firsthand experience with reluctance to have my papers accepted, particularly in one specific case. I had submitted the article to a prominent journal, and all of the referees gave it the highest recommendations for publication. But then the editor rejected it without any explanation. I was pretty disturbed by that, so I made it a point to attend the next meeting that editor was attending so I could meet him. I went up to the desk and said I wanted to speak to him. They took me to meet him, and I introduced myself and said, “Sir, I have a question for you. I submitted a paper to your journal, which is a very prestigious journal, and the reviewers all endorsed it. But you rejected it, so I made it a point to come to this meeting to get your explanation.” He replied, “Oh, I thought you were a woman! Now that I know that you are a man, I will accept it immediately!” But I replied, “Sir, I will never submit a paper to you again.”

I’m proud to say I stuck by that statement. But that experience just taught me the importance of recognizing everyone’s talents and abilities—regardless of gender, race, or background—in the science realm.



“ My first piece of advice is to attend regional meetings if they are available, and certainly the national meeting of the ASMS. ”

Jean in 2003 at the 225th ACS National Meeting in New Orleans along with then-coworkers and colleagues (from left to right) David Koppenaal (PNNL), Michelle Buchanan (Oak Ridge National Laboratory), Teresa Fryberger (PNNL), and Richard D. Smith (PNNL, 2003 Analytical Chemistry ACS Award Winner). (Photo courtesy of Jean Futrell.)

As one of the founders of modern mass spectrometry, what advice do you have for younger scientists who aspire to rise to this level?

My first piece of advice is to attend regional meetings if they are available, and certainly the national meeting of the ASMS. Before you go, study the agenda of the meeting very carefully to find the presentations that most closely match your interests in whatever stage of your career you might be. Make a point of attending the lectures, and particularly the symposium lectures that are most relevant to your field. But also make it a point to attend the poster sessions. Again, look for your own field of interest, pay attention to the seasoned experts, and engage them in conversation. Also reserve some time to go to the special student poster session so that you can strike up conversations with the students, too. In general, just get to know people and don't be afraid to start a dialogue—that's how it all begins!

We understand that you served as a director and Battelle fellow at the Pacific Northwest National Laboratory from 1998 to 2013. What were some of the differences between working at the national lab compared to your previous positions?

They are just totally different environments. When you work at a national lab, you get unique opportunities to engage with universities. As director of the lab, I had that kind of opportunity, and because of my academic background, it was quite straightforward for me to engage with the University of Washington and Washington State University, working with the most distinguished researchers in and near Seattle. I made it a point to engage with these science leaders and invite them to give lectures at PNNL. As a result of this kind of contact, I was able to develop relationships and establish symposia. This, combined with the fact that we had the most advanced

instrumentation in the world, allowed us to address questions from so many different perspectives. It was truly both a national and international resource.

Can you describe any of the defining moments in your career as a scientist?

There have definitely been several. First, as I mentioned before, there was getting the tandem mass spec to work—that was certainly a defining moment. In addition, I had defining moments in engaging funding agencies and in engaging the scientific community worldwide. Establishing contact with world leaders has also been big. All of the experiences are important—both the successes and the failures. The failures might even be more important, because somebody somewhere might be able to resolve them.

We understand that you recently had a special birthday. Any fun plans to mark the occasion?

I have just turned 90 and was able to celebrate this milestone with immediate family. But I also enjoyed the recognition that I unexpectedly received for the occasion in Arizona at the community in which we have our winter home. Within that community, there were, to my surprise, more than 100 people who were experiencing their 90th birthdays—so, they arranged a whole big event around them! They had music performances, small stage plays, and so on. They also had each of us walk across the stage and take a brief bow. I even won a prize in a drawing, which was a bunch of balloons that were almost as tall as me. So I guess you might say folks are now inflating me again! I really and truly appreciated that they recognized the fact that so many of us have survived to see our 90th birthdays and that we are still articulate enough to say hello!